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A NEW RESOLUTION

OF THE

Diameters and Distances

OF THE

Heavenly Bodies

BY COMMON ARITHMETIC.

ACCOMPANIED WITH AN

Exhibit of the Variations of the Astronomers,

AND A

DISPROOF OF THE NEWTONIAN THEORY

OF

UNIVERSAL GRAVITATION.

BY WM. ISAACS LOOMIS,

Piermont, Rockland Co., N. Y.

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TRUTHS.

Proverbs, Chapter III., Verses 5, 6.

1. "TRUST in the Lord with all thy heart; and lean not unto thine own understanding. In all thy ways acknowledge him, and he shall direct thy paths."

2. Open to men the right path, aided by God-given and God-directed reason, and then the humblest of our race may become familiar with the works of God.

A comparison of my manner of determining the diameters and distances of the heavenly bodies with others.

T. Dick's rule and example to find the real diameter of the moon is given by him in the third volume of his works, on p. 144 of *Celestial Scenery:*

"As radius : is to C G, the distance of the moon, 238,800 miles, : : so is the sine of A C G, 15′ 43″ : to the number of miles contained in the moon's semi-diameter, A G=1091½, which, being doubled, gives 2,183 miles as the diameter of the moon.

2d term—C G=238,800—Log....	5.378028
3d term—sine of A C G, 15′ 43″ ..	7.660059
	13.038087
1st term—radius.....	10.000000
Semi-diameter of the moon 1.091½=	3.038087
2	
2,183"	

My rule and example to find in the fourth term of a simple proportion the real diameter of the moon:

As the angle of the equatorial horizontal parallax of the moon 57′ 5″ : is to her apparent diameter of 31′ 26″ : : so is the base line of the parallax 3,963 miles : to a fourth term in simple proportion in common arithmetic = the moon's real diameter.

Demonstration.—As 57′ 5″ : 31′ 26″ : : 3,963 miles : 2,182 miles, which is the moon's real diameter.

Planetary Distance.

After the manner of Kepler, to find the distance of any planet from the sun.

Rule.

Divide the square of the planet's sidereal revolution round the sun by the square of the earth's sidereal revolution, and multiply the cube root of the quotient by the earth's mean distance from the sun. In the use of this rule to find the distance of the planet Mercury from the sun by common arithmetic, or by logarithms, Burritt, on p. 160 of his *Geography of the Heavens*, says: "He need not think himself a *dull* scholar, if by the former method he comes to the true result in FIVE HOURS; nor remarkably quick, if by the latter he comes to it in *five minutes.*"

N. B.—My distance of Mercury was obtained in less than five minutes by common arithmetic. (See the example on p. 93.)

T. Dick's Moon's Distance by Logarithms.

2d term—3,965=the earth's semi-diameter.....	3.598243
3d term—radius.....	10.000000
	13.598243
1st term—sine of 57′ 5″	8.220215
M C, distance of moon, 238,800 miles =	5.378028

Moon's Distance by the Author's Method.

As the angle of the moon's parallax of 57′ 5″ : is to the circle in degrees 360° : : so is the base line of the parallax 3,963 miles : to the circle in miles 1,499,576, the semi-diameter of which is 238,665 miles, which is the moon's mean distance from the earth. (See my rules on diameters and distances.)

The advantages of my method are : *First*, brevity in operation, astonishingly so, in finding the diameters of the heavenly bodies. *Second*, independent of a knowledge of trigonometry and logarithms, with a very limited knowledge of common arithmetic, these problems to find the diameters and distances of the heavenly bodies may be solved.

Lest any should stumble because my results vary somewhat from those of the astronomers, it may not be amiss to notice the difference between some of the least and greatest diameters of the planets which astronomers have assumed to be very near approximations to the truth.

Sir John W. Herschel makes the diameter of Mercury 156 miles more than Burritt states it to be, and 540 miles more than Ferguson's diameter. Between Ferguson's and Bartlett's estimates of the

diameter of Venus there is a difference of 530 miles. O. M. Mitchel's value of Jupiter's real diameter is 11,164 miles more than that given by Ferguson, and 5,164 miles more than Herschel's diameter. E. H. Burritt's computation of the diameter of Saturn exceeds Ferguson's by the enormous sum of 14,952 miles. Sir J. W. Herschel estimated the diameter of Neptune to be 7,890 miles greater than O. M. Mitchel's estimate.

Diameters of Heavenly Bodies.

I will give the angles or arcs, which are the measures of the angles of certain parallaxes of heavenly bodies, their apparent diameters, base line of the parallaxes, and the rule to determine their real diameters by simple proportion.

Moon's angle or arc of parallax....	57′ 5″
Sun's " " "	8″.6
Mercury's " " "	14″
Venus' " " "	31″
Mars' " " "	16″
Jupiter's " " "	2″
Saturn's " " "	1″
Uranus' " " "	0″.4722
Neptune's " " "	0″.2967

Apparent Diameters.

Moon's apparent diameter.....	31′ 26″
Sun's " "	32′ 12″.6
Mercury's " "	11″
Venus' " "	61″.2
Mars' " "	16″.61
Jupiter's " "	47″
Saturn's " "	18″
Uranus' " "	4″
Neptune's " "	2″.5

The equatorial semi-diameter of the earth is the base line of all equatorial horizontal parallaxes, the linear measure being 3,963 miles.

Rule.

As the angle of the equatorial horizontal parallax of a heavenly body : is to its apparent diameter : : so is the base line of the parallax : to the real diameter of the heavenly body.

Demonstrations.

DIAMETER OF THE MOON.

1. As the angle of the Moon's parallax..... 57′ 5″ :
   Is to her apparent diameter..... 31′ 26″ : :
   So is the base line of the parallax, 3,963 miles :
   To the real diameter of the moon, 2,182 miles.

DIAMETER OF THE SUN.

2. As the angle of the Sun's parallax, 8″.6 :
   Is to his apparent diameter..... 31′ 12″.6 : :
   So is the base line of the parallax, 3,963 miles :
   To the real diameter of the sun. 890,569 miles.

DIAMETER OF MERCURY.

3. As the angle of Mercury's parallax, 14″ :
   Is to his apparent diameter..... 11″ : :
   So is the base line of the parallax, 3,963 miles :
   To the real diameter of Mercury, 3,113 miles.

DIAMETER OF VENUS.

4. As the angle of Venus' parallax, 31″ :
   Is to her apparent diameter..... 61″.2 : :
   So is the base line of the parallax, 3,963 miles :
   To the real diameter of Venus... 7,823 miles.

DIAMETER OF MARS.

5. As the angle of Mars' parallax.. 16″ :
Is to his apparent diameter..... 16″.61 : :
So is the base line of the parallax, 3,963 miles :
To the real diameter of Mars.... 4,114 miles.

DIAMETER OF JUPITER.

6. As the angle of Jupiter's parallax, 2″ :
Is to his apparent diameter..... 47″ : :
So is the base line of the parallax, 3,963 miles :
To the real diameter of Jupiter.. 93,130 miles.

DIAMETER OF SATURN.

7. As the angle of Saturn's parallax, 1″ :
Is to his apparent diameter..... 18″ : :
So is the base line of the parallax, 3,963 miles :
To the real diameter of Saturn.. 71,334 miles.

DIAMETER OF URANUS.

8. As the angle of Uranus' parallax, 0″.4722 :
Is to his apparent diameter..... 4″ : :
So is the base line of the parallax, 3,963 miles :
To the real diameter of Uranus.. 33,571 miles.

DIAMETER OF NEPTUNE.

9. As the angle of Neptune's parallax, 0″.2967 :
Is to his apparent diameter..... 2″.5 : :
So is the base line of the parallax, 3,963 miles :
To the real diameter of Neptune, 33,392 miles.

BY MY METHOD.

The Moon's real diameter is..... 2,182 miles.
" Sun's " " .....890,569 "
Mercury's " " ..... 3,113 "
Venus' " " ..... 7,823 "
Mars' " " ..... 4,114 "

Jupiter's	real	diameter is	.....	93,130 miles.
Saturn's	"	"	.....	71,334 "
Uranus'	"	"	.....	33,571 "
Neptune's	"	"	.....	33,392 "

Distances of the Planets.

1. The sines and tangents of the angles of the equatorial horizontal parallaxes of the sun and planets differ so insensibly from each other, that, without liability to error, the linear measure of the arc of any one of these angles may, without further labor, be assumed to be the same as the linear measure of the tangent of the angle.

2. In the projection of an equatorial horizontal parallax there is exhibited a right-angled triangle, the base line of which is the equatorial semi-diameter of the earth, and its perpendicular leg represents the distance.

3. Because the perpendicular leg of any right-angled triangle is the semi-diameter of a circle, an arc of which is the measure of the angle at the vertex, it is evident that, given the degree and linear measure of the arc of the angle, the perpendicular leg of any right-angled triangle may be determined in the same way that we determine the semi-diameter of a circle, given the degrees and linear measure of an arc of a circle to find its semi-diameter.

Example.

To find the perpendicular leg of a right-angled triangle: Given the angle at the vertex 12°, and the linear measure of the arc of the angle 12 inches.

Demonstration.—As 12° : 360° : : 12 inches : 360 inches÷3.14159=114.59÷2=57.29 inches, which is the linear measure of the required leg.

This method may be employed to find the distances of the heavenly bodies, substituting the linear measure of the base line of the parallax for that of the arc.

Rule.

As the angle of any equatorial horizontal parallax : is to the circle in degrees : : so is the linear measure of the base line of the parallax : to the linear measure of the circle, the semi-diameter of which is the perpendicular leg of the right-angled triangle of the parallax.

Demonstrations.

DISTANCE OF THE MOON.

1. As the angle of the Moon's parallax, 57′ 5″ :
Is to the circle in degrees..... 360° : :
So is the base line of the parallax, 3,963 miles :
To the circle in miles 1,499,576÷3.14159= 477,330÷2=238,665 miles, which is the moon's mean distance.

DISTANCE OF THE SUN.

2. As the angle of the Sun's parallax, 8″.6 :
Is to the circle in degrees..... 360° : :
So is the base line of the parallax, 3,963 miles :
To the circle in miles, 597,214,853.7209313÷ 3.1415926=190,099,404, which is the diameter of the earth's orbit, ÷2=95,049,702 miles, the linear measure of the perpendicular leg of the right-angled triangle projected in the sun's equatorial horizontal parallax, and is the mean distance of the sun from the earth.

DISTANCE OF MERCURY.

3. As the angle of Mercury's parallax, 14″ :
Is to the circle in degrees..... 360° : :
So is the base line of the parallax, 3,963 miles :
To the circle in miles 366,860,571.4285714, the semi-diameter of which is 58,387,674 miles, and is the distance of Mercury from the earth at the time of his inferior conjunction. Subtract this distance of the planet from the earth from the earth's mean distance from the sun, and the remainder, 36,662,028 miles, is Mercury's distance from the sun.

DISTANCE OF VENUS.

4. As the angle of Venus' parallax, 31″ :
Is to the circle in degrees..... 360° : :
So is the base line of the parallax, 3,963 miles :
To the circle in miles 165,678,967.7419354, the semi-diameter of which is 26,368,627, and is the distance of Venus from the earth at the time of her inferior conjunction. Subtract this distance of the planet from the earth from the earth's mean distance from the sun, and the remainder, 68,681,075 miles, is the distance of Venus from the sun.

DISTANCE OF MARS.

5. As the angle of Mars' parallax .. 16″ :
Is to the circle in degrees..... 360° : :
So is the base line of the parallax, 3,963 miles :
To the circle in miles 321,003,000.0000000, the semi-diameter of which is 51,089,215 miles, and is the distance of Mars from the earth at the time of his opposition. Add this distance of the planet from the earth to the earth's mean distance from the sun, and the sum 146,138,917 miles is the distance of Mars from the sun.

DISTANCE OF JUPITER.

6. As the angle of Jupiter's parallax, 2″ :
Is to the circle in degrees..... 360° : :
So is the base line of the parallax, 3,963 miles :
To the circle in miles 2,568,024,000.0000000, the semi-diameter of which is 408,713,720 miles, and is the distance of Jupiter from the earth at the time of his opposition. Add this distance of the planet from the earth to the earth's mean distance from the sun, and the sum, 503,763,422 miles, is the distance of Jupiter from the sun.

DISTANCE OF SATURN.

7. As the angle of Saturn's parallax, 1″ :
Is to the circle in degrees..... 360° : :
So is the base line of the parallax, 3,963 miles :
To the circle in miles 51,360,480,000.0000000, the semi-diameter of which is 817,427,425 miles, and is the distance of Saturn from the earth at the time of his opposition. Add this distance of the planet to the earth's mean distance from the sun, and the sum 912,477,123 miles is the distance of Saturn from the sun.

DISTANCE OF URANUS.

8. As the angle of the parallax of
Uranus..... 0″.4722 :
Is to the circle in degrees..... 360° : :
So is the base line of the parallax, 3,963 miles :
To the circle in miles 10,876,848,793.0000000, the semi-diameter of which is 1,731,105,871 miles, and is the distance of Uranus from the earth at the time of his opposition. Add this distance of the

planet from the earth to the earth's mean distance from the sun, and the sum, 1,826,155,573 miles, is the distance of Uranus from the sun.

DISTANCE OF NEPTUNE.

9. As the angle of the parallax of
Neptune ..... 0″.2967 :
Is to the circle in degrees ..... 360° : :
So is the base line of the parallax, 3,963 miles :
To the circle in miles 17,310,576,339.7371028, the semi-diameter of which is 2,755,063,855 miles, and is the distance of Neptune from the earth at the time of his opposition. Add this distance of the planet from the earth to the earth's mean distance from the sun, and the sum, 2,850,113,557 miles, is the distance of Neptune from the sun.

Solar Distances of the Planets.

Mercury's solar distance			36,662,028	miles.
Venus'	"	"	68,681,075	"
Earth's	"	"	95,049,702	"
Mars'	"	"	146,138,917	"
Jupiter's	"	"	503,763,422	"
Saturn's	"	"	912,477,123	"
Uranus'	"	"	1,826,155,573	"
Neptune's	"	"	2,850,113,557	"

The distances of the heavenly bodies may be found by Division. I will exhibit two examples.

Rule.

Divide the linear measure of the tangent of the angle of the parallax by the circular measure of the arc of the parallax, and the quotient will be the term required.

Distance of the Moon by Division.

1. The circular measure to seven places of decimals of the arc of the angle of the moon's parallax of 57′ 5″ is 0166048.

2. The linear measure of the tangent of the angle of the parallax, with seven ciphers annexed, is 3,963.0000000.

Demonstration by Division.— 3,963.0000000÷ 0166048=238,665 miles, which is the moon's mean distance.

Distance of the Sun by Division.

1. The circular measure to twelve places of decimals of the arc of the angle of the sun's parallax of 8″.6, is 000041693976.

2. The linear measure of the tangent of the angle of the parallax, with twelve ciphers annexed, is 3,963.000000000000.

Demonstration by Division.—3,963.000000000000 ÷000041693976=95,049,702 miles, which is the sun's mean distance. Compare these results with the mean distances of the sun and moon, found by a different process on p. 92.

1. I have demonstrated how to find the diameter of any one of the heavenly bodies in the fourth term of a single proportion.

2. I have shown how to determine the linear measure of the perpendicular leg of a right-angled triangle in the same way employed to find the semi-diameter of a circle, thus bringing within the reach of all a way to find the distances of the heavenly bodies by common arithmetic.

3. By a very simple process in Division, I have resolved the distances indicated by the parallaxes of the moon and sun.

Circular Measure.

A circle, whose radius is unity, the circular measure of its circumference retaining twelve places of decimals, is 6.283185307179=360°.

The circular measure of an arc of one degree is 0.017453292519.

The circular measure of an arc of one second of a degree is 0.000290888208. The circular measure of the arc of the parallax of any one of the heavenly bodies may be found, and the distance indicated by the parallax be determined by division, as in the given examples.

My ambition in this department of science is satisfied. I had most earnestly desired, longed for, and labored to bring the solutions of these astronomical problems within the reach of all who understand common arithmetic. Having accomplished this, I leave it to others to extend, by a little modification of my rule, the principle of finding the unknown perpendicular leg of any right-angled triangle, the linear measures of whose sine, arc, and tangent disagree in consequence of the largeness of the angle.

The Stars are without Parallax.

A near and fixed object will suffer no apparent displacement when viewed from a mere point (like it would if viewed from the extremities of a line); and ten or ten thousand observations from the same point would all be in the line of the visual ray of the first observation. So it is in all observations made to determine stellar parallaxes. They are all in the line of the same visual ray that was first directed to a star to find its distance, and,

therefore, for the want of a line whose longitude would subtend an appreciable angle, the stars are of necessity without appreciable parallax.

1. On p. 6, I have given the resulting distance of a star's annual parallax of 1″ of a degree. The assumption shows that the distance to the nearest star can not be less than nearly forty trillions of miles, and how much further who can tell, for the stars, as it respects the annual motion of the earth, are without variableness, having no shadow of turning.

2. The whole diameter of the earth's orbit, if compared with the line of a star's distance, is a mere point; but the astronomers make the base line of their annual parallaxes but one-half of the diameter of the orbit of the earth, and consequently but half a point. Now a mere point is without length, breadth, or thickness, being without assignable quantity; and strange that but half of an unassignable quantity is the chosen base line of the astronomers. This being so relatively true, the marvels of the astronomers' parallaxes of the stars, if true, involve a greater marvel, that, from a series of observations made from the extremities of but half a point, certain stars have been found to have a very appreciable quantity of parallax in angular measurements, varying from 0″.046 to 0″.915.

3. That the assertion, "the whole diameter of the earth's orbit, when compared with the distance of a star, dwindles to a mere point," may be implicitly received as true, Burritt says: "The whole diameter of the orbit of Saturn (1,824,915,246 miles) is no thicker than a spider's web when compared with the distance of the stars."

The Examination.

From what I have written, before I presented this portion of my work to be thought of by men, there can be : *First*, no mutual gravitation of the heavenly bodies among themselves. *Second*, for the want of this mutual gravitation of the celestial spheres, the theory of the precession of the equinoxes is without the ratification of nature. *Third*, the time and revolution of the sidereal year of the sun is baseless. *Fourth*, by the testimony of nature I will be able to establish the fact, that our earth, which is an oblate spheroid, revolves around the sun after the manner of a homogeneous and perfect sphere revolving around the sun, the density of its matter not affected by the force of its axial rotation. *Fifth*, the variations of the astronomers are wonderful ; and that the disciples of Newton, who are among the most highly gifted of the sons of earth, should have been so much out of the way, affords cause for a deliberate inquiry : What is truth ?

But before we engage further in the grand conflict, it will, without doubt, be pleasant to my readers to know that the system of astronomy which originated with Copernicus was enlarged and improved by Sir Isaac Newton, and expounded, to the wondering delight of intelligent men and women, from age to age, is, by its friends and admirers, thought to be unimpeachable, and its collections of dogmas synonymous with a collection of the facts of nature. The words of Ferguson, Herschel, and Dick will best set forth their views.

1. In Ferguson's *Astronomy*, p. 41, he says : "Sir Isaac Newton has established this system on such an everlasting foundation of mathematical

and physical demonstration as never can be shaken, and none who understand him will hesitate about it."

2. Herschel, in his *Outlines of Astronomy*, p. 19, says: "There is now no danger of any revolution in astronomy like those which are daily changing the features of the less advanced sciences."

3. In Dick's works, Vol. III., p. 25, he says: "The system broached by Copernicus, notwithstanding much opposition, soon made its way among the learned in Europe. It was afterward powerfully supported by the observations and reasonings of Galileo, Kepler, Halley, Newton, La Place, and other celebrated philosophers, and now rests on a foundation firm and immutable as the laws of the universe."

Now, not believing that the shaking of the Copernican system of astronomy is the same as shaking the true facts of nature, I advance in my work, and hope, as I have often prayed on this subject, to aim for the right way and the gain of the truth, and God defend and prosper me.

"Precession of the Equinoctial Points."

PROPOSITION.

Through the earth's annual motion round the sun, the stars seen from our earth do not change their points of rising, and the theory of the precession of the equinoxes teaching they do, the testimony of nature is to be accepted; and as such a phenomenon could only arise from the fact of the earth preserving the invariability of its equinoctial points, I infer from this testimony of nature that there is nothing in nature to warrant the conclu-

sion that the equinoctial points fall back, there is no "regress of the earth's nodes."

The amount of the precession of the equinoxes is said to be 50″.1 of a degree every year; and were the theory as much a fact of nature as it is supposed to be by learned astronomers, the stars would change their points of rising 50″.1 of a degree every year; and a star, which in A. D. 1858 rose in the plane of the celestial equator, would in A. D. 1868 rise 8′ 21″ east of the celestial equator. But a star, and all stars which this year describe the circle of the celestial equator, and circles parallel to and declining to either side of it, describe the same diurnal circles which they appeared to do last year, or ten years ago. This unanimous verdict of the invariability of the whole starry host, is nature's decisive refutation of the theory of the precession of the equinoxes.

The Pseudo Sidereal Year of the Sun.

Webster, under the word year:—"*Sidereal year;* the time in which the sun, departing from any fixed star, returns to the same. This is 365 days, 6 hours, 9 minutes, 9.6 seconds."

The astronomers and lexicographers are unanimous in their opinions as to the time and existence of their sidereal year of the sun, but the times of the real and apparent revolutions of the heavenly bodies fully demonstrate the fallacy of the so-called "sun's sidereal year." At a time when the centres of the earth, sun, and a star are in a straight line, let the time and revolution of the apparent yearly sun begin by the star, and because of the apparent diurnal motion of the stars in the time of 23 hours, 56 minutes, 4.09 seconds, at the close of the time of the yearly revolution, when the centres of the

earth, sun, and star should be in the same straight line, the star will be advanced 92° + beyond the line. Hence, because the time of the astronomers' sidereal year of the sun is not a multiple of the time of the apparent diurnal revolutions of the stars, their sidereal year of the sun exists not in nature.

The Pseudo Sidereal Revolution of the Earth.

Because the stars have apparent diurnal motion, and the time of the yearly revolution of the earth is not a multiple of the time of the diurnal revolutions of the stars ; all revolutions of heavenly bodies based on a fixed star are false.

In Herschel's *Outlines of Astronomy*, p. 202, he says : "The annual retreat of the equinox is 50″.1, and this arc is described by the sun in the ecliptic in 20 minutes, 19.9 seconds. By so much shorter is the periodical return of our seasons, than the true sidereal revolution of the earth round the sun."

But the earth does not set out from a star in its journey round the sun ; the effect on the stars being the same as if the orbital motion had no existence, and therefore Herschel's "true sidereal revolution of the earth round the sun" is nothing more than his aberration from the facts of nature.

The Cause of Kepler's Failure.

It is known to all informed, that the sun and stars have perpetual apparent motions. When Kepler set about to found his sidereal revolutions of the planets, he excluded from his calculations the perpetual apparent diurnal motion of the stars, assumed their fixedness, and then from a fixed star laid the foundation for his sidereal revolutions of the planets. This exclusion of the apparent motion of the stars led to a false system ; and being con-

trary to nature, the revolutions must be also contrary to nature, having no place but in the assumption. Therefore, when Sir Isaac Newton, in his *Principia*, p. 388, says, "The periodic times with respect to the fixed stars," he is perpetually contradicted by the perpetual apparent motion of every star in the celestial sphere.

Variations of the Astronomers.

1. T. Dick says: "The effect of the regress of the equinoctial points, is to cause an apparent revolution of the stars around the poles of the ecliptic."

2. Mattison, in his *High School Astronomy*, p. 70, says: "The distant stars have no motion, real or apparent, around the poles of the ecliptic."

3. The reader will observe, that what Dick affirms, Mattison denies.

4. Burritt's *Geography of the Heavens*, p. 29, says: "In consequence of the motion of the earth eastward in its orbit, the stars appear to have a motion westward."

5. Mitchel's *Popular Astronomy*, p. 77, on the orbital motion of the earth, says: "Now the earth's centre in the space of one day and night, or during one rotation, actually passes over 2,000,000 of miles; and it would seem as though this change of position would sensibly affect the return of our star to the meridian; but such is the vast distance of the stars, that visual rays sent to the same star from the extremities of a base line of 2,000,000 of miles in length, are absolutely parallel under the most searching instrumental scrutiny that man has been able to make."

6. What Burritt affirms, Mitchel denies.

7. Webster, in his *Spelling Book*, p. 144, says: "The earth turns every part of its surface to the sun once in twenty-four hours." Suppose Webster to have opened a school among the Indians of the far north, who had not seen the sun for more than a month. He informs his pupils that the learning of centuries has culminated in demonstrating the fact of the earth turning every part of its surface to the sun once in twenty-four hours. After such an announcement, who of the company would appear to be the most stupid—the great American lexicographer, or his pupils? They might inquire what earth is meant; for surely this part, occupied by us, has not seen a ray of the sun for more than thirty times twenty-four hours. Contrary to this, the earth turns every part of its surface to the sun once in the time of 365 solar days, 5 hours, 48 minutes, 48 seconds, and as is the difference between the time of a solar day and solar year; so great is the mistake of Webster.

8. Burritt teaches: "The earth moves eastward in its journey round the sun."

9. Dr. T. P. Jones, in his *Conversations on Natural Philosophy*, p. 105, says: "The earth moves westward in its journey round the sun."

10. In the mental romp led on by Humboldt, in his *Cosmos*, Vol. I., p. 88, he says: "Light travels one distance of Sirius in three years."

11. Peters says: "The distance of Sirius from the earth is so great, that the time required for its light to reach us is fifteen years."

12. Mitchel's *Planetary and Stellar Worlds*, p. 211, says: "Stars of the first magnitude send us their light in about seventeen years." Among the stars of the first magnitude Sirius is numbered.

13. "Henderson reached the conclusion, in his observations on Sirius, that it required twenty-one years and nine months for the light of that star to reach the earth."

14. From among the big thoughts I select: "Huyghens assumed the intrinsic brightness of Sirius to equal the sun."

15. O. M. Mitchel says: "Sirius is the brightest and probably the largest of the fixed stars, with a diameter of more than a million of miles."

16. Wollaston says: "Sirius is equal to sixty-three suns."

17. Humboldt says: "Arcturus is equal to 1,331 suns."

18. Herschel says: "The star Vega in Lyra is thirty-eight times the diameter of the sun, and its solid contents 57,872 times greater."

19. Mattison outdoes these liliputian calculations by saying: "The star 61 in the Swan is estimated to be 200,000,000 of miles in diameter." Not far from being 10,000,000 times larger than the sun.

20. In Humboldt's *Cosmos*, Vol. IV., p. 120, on the sidereal revolutions of the planets, he says: "During such a revolution a planet passes through exactly 360° in its course round the sun;" and in this conclusion all astronomers rest.

21. In Webster's Dictionary, under "*Tropical Year*,—The period occupied by the sun in passing from one tropic, or one equinox, to the other. On account of the precession of the equinoxes, it is 20 minutes, 20 seconds, shorter than the sidereal year;" and in arc, according to Herschel, 50″.1 of a degree less than 360°. In this difference all the astronomers are agreed.

22. The difference among the advocates of the sidereal and tropical revolutions of the sun is not calculated to produce a conviction of the infallible nature of their science, as will be made to appear, in that Ferguson and Burritt give to the apparent sun the same number of degrees in his tropical revolution that is given by Kepler, Newton, and Humboldt to a planet or the sun in their sidereal revolutions.

23. In Ferguson's *Astronomy*, p. 152, he says: "The sun describes the whole ecliptic, or 360° in a tropical year." It should be 50″.1 of a degree less than 360°.

24. In Burritt's *Geography of the Heavens*, Part II., p. 114, he says: "The sun describes the whole ecliptic, or 360°, in a tropical year." It should be 50″.1 less than 360°. Thus confounding the sidereal and tropical revolutions in degree. If the science had been true, the advocates were in these things mistaken, for the tropical revolution in degree should be 50″.1 of a degree less than the sidereal revolution; but they were engaged in expounding a mere theory, as is abundantly evidenced by the variations adduced.

25. As there is no two returns of the centre of the sun or that of the earth to the same fixed star in the time in which the earth passes through exactly 360° of orbital revolution, the sidereal, tropical, and equinoctial revolutions of the astronomers in time and degrees are confusion; and their confounding the tropical and sidereal revolutions with each other in degree gives no illumination to their infallible scheme, which they supposed consisted of a transcript of the facts of nature.

Parallelism of the Earth's Axis.

1. The earth is an oblate spheroid, and being carried around the sun by the effect of an original sidewise impulse, and not by the sun's assumed attraction, revolves as if it were a homogeneous and perfect sphere, maintaining the invariability of its equinoctial points and the constancy of the poles of the heavens.

2. The line of the earth's axis prolonged to the sphere of the stars is the axis of the heavens, around which the stars appear to revolve; and in whatever part of its orbit the earth may be in, at either solstice or equinoctial point, the axis of the earth will coincide with the axis of the heavens.

3. To this definition Herschel rigidly adheres in his *Outlines of Astronomy*, p. 192, for he says: "In this annual motion of the earth its axis preserves at all times the same direction, as if the orbital motion had no existence, and is carried around parallel to itself, and pointing always to the same vanishing point in the sphere of the fixed stars."

4. From this absolute parallelism Herschel, not nature, departs in his *Outlines of Astronomy*, p. 172. He says: "It is found, then, that, in virtue of the uniform part of the motion of the pole, it describes a circle in the heavens around the pole of the ecliptic as a centre, keeping constantly at the same distance of 23° 28′ from it, in a direction from east to west, and with such a velocity that the angle described by it in this, its imaginary orbit, is 50″.10."

5. In Herschel's *Treatise on Astronomy*, third edition, p. 169, he says: "The bright star of the Lesser Bear, which we call the Pole Star, has not always been, nor will always continue to be, our

cynosure; at the time of the earliest catalogues it was 12° from the pole; it is now (1835, date of the edition) only 1° 24′, and will approach yet nearer."

6. For the next twenty-four years the distance remained constant; for in Herschel's *Outlines of Astronomy*, fourth edition, p. 173, he says: "The bright star of the Lesser Bear, which we call the Pole Star, has not always been, nor will always continue to be, our cynosure; at the time of the construction of the earliest catalogues it was 12° from the pole; it is now (1859, date of the edition) only 1° 24′, and will approach yet nearer." So that, according to the statements of Herschel, from the time of the earliest catalogues to 1835 the distance between the pole of the heavens and the bright star of the Lesser Bear was diminished 10° 36′ by a constant departure of the earth's axis from its parellelism. But from 1835 to 1859 the distance was the same, preserving the parellelism of the earth's axis for a period of twenty-four years.

7. In Rollin's *Ancient History*, Book I., p. 141, he says: "The poles of the heavens have remained the same for a period of three thousand years."

8. Herschel teaches that the poles of the heavens go forward, as an effect of the precession of the equinoxes.

9. Ferguson, in his *Astronomy Explained on the Principles of Sir Isaac Newton*, says: "The poles of the heavens, as an effect of the precession of the equinoxes, fall backward." Place these extremely opposite motions of the same pole of the heavens along side of Burritt and Jones's opposite motions of the earth, and the faith and reason which will comprehend how the earth can move backward and forward in its orbit at the same time will have

no trouble in explaining how the motion of the poles of the heavens can, at the same time, be invariable, and in motion, in opposite directions.

Proposition.

The earth revolves around the sun the same as if it were a homogeneous and perfect sphere. If the Newtonian law of universal gravitation, admitted, as we will see subsequently, to be the weakest of all forces of attraction, the superior forces of the motion of the heavenly spheres would absolve them from all allegiance to the sun's attraction. For the better understanding of the argument, I am willing to admit the existence of all Newton claimed for his discovery, and then show that the mutual attractions of every atom of matter, and of the mass of every sphere, tends to a perfet equilibrium.

Hypothesis.

Suppose a homogeneous and perfect sphere, of a consistence not to be molded into the form of an oblate spheroid as an effect of axial rotation, of the size of the earth as nearly as may be, revolving around the sun as an effect of the assumed attraction of gravitation of the sun.

According to Newton, there being no redundant matter gathered at the equator of such a globe, its nodes will not regress, and its axial rotation will not be acted on by centripetal force, as is the case with an oblate spheroid.

1. Seen from the surface of such a globe following the earth round the sun, during the time of one or one hundred orbital revolutions, the stars will preserve the invariability of their points of rising, culminating, and setting.

2. It is identically so with the stars seen from

our earth. The star watchers have kept their intense gaze on the rays of the twinkling stars, and eagerly sought to know: Do the stars change their points of rising from day to day, from year to year? And to every inquiry, they have given an invariable shining, No; never.

3. The same conclusion was reached by O. M. Mitchel, in his *Popular Astronomy*, p. 18: "An examination of the points of rising, culminating, and setting of the fixed stars, showed them to be absolutely invariable." Therefore, because the stars seen from the earth never change their points of rising, culminating, and setting, which phenomenon is authenticated by O. M. Mitchel, this fact of nature is a demonstration that the earth moves round the sun, the same as if it were a homogeneous and perfect sphere.

4. The position of the earth when at one or the other of the equinoctial points, if the sun's attraction of gravitation affects the earth, the attraction must be the same on the northern hemisphere that it is on the southern hemisphere, resulting in a perfect equilibrium, the same as if the whole matter of the earth was absolutely balanced on its centre, preserving the parallelism of the axis and the constancy of the poles of the heavens. So when the earth is at either equinoctial point, the action of the gravity of the sun is the same as if the earth were a homogeneous and perfect sphere.

5. The equatorial diameter of the earth equals 7,926 miles, and its polar diameter 7,900 miles. Within the earth you may describe a perfect sphere, every diameter of which equals the earth's polar diameter. The excess of matter above the contents of this perfect sphere is thirteen miles, thick at the

circumference of the equator, declining gradually from either side of it to both the poles, at which points it is 0. This excess of matter constitutes the difference between a perfect sphere and an oblate spheroid, and on it (sometimes called the redundant or superabundant matter gathered at the equatorial regions) Newton supposed the attraction of the sun acted to cause the equinoctial points to regress. This involves the novelty of the sun's attraction being greatest on small quantities of matter, and least on greatest quantities of matter. Thus prepared with the quantities requisite to understand the subject, suppose a ring of matter, of the consistence and mass of that portion of the earth included in the difference between its polar and equatorial diameters, revolving around the sun, having the inclination of its axis the same as that of the earth.

The equinoctial points of such a ring will, according to Newton, be continually regressive.

Then at some distance from the ring, with a swifter motion, suppose a homogeneous and perfect sphere to be revolving around the sun, of a size to fit within the ring, having the same inclination of axis with the ring.

Of such a sphere Newton says, in *Principia*, p. 214, Book I.: "And the inclination of the axis, or the velocity of the rotation, will not be changed by centripetal force." The sphere overtakes the ring, passes into it, and when the equator of the sphere touches the equator of the ring, they adhere, and instantly the force of the attraction of gravitation on the sphere to preserve the parallelism of its axis, assisted by the additional force of its axial rotation, overcomes the very small force of the

attraction of gravitation on the ring to cause the regress of its equinoctial points, and henceforth, in the union of the ring and sphere, the now spheroid will move round the sun the same as if it was a homogeneous and perfect sphere.

Corollary 1. The precession of the equinoxes assumes that the attraction of gravitation is stronger on that part of the earth thirteen miles deep at the equatorial regions, diminishing to 0 at the poles, than it is on the contents of the sphere within it, whose diameter is 7,900 miles. This is unreasonable.

Corollary 2. The precession of the equinoxes supposes that the force of the attraction of universal gravitation is more on one pound of matter of that part of the earth which constitutes its oblate form of matter, than it is on ten pounds of matter of its spherical contents under the same law; and this proportion being much greater in relation to the matter of the earth, which gives it its oblate form, compared with the enormous amount included within the sphere whose diameter is 7,900 miles. By so much is the absurdity greater.

Corollary 3. If the force of this attraction of universal gravitation on the shell of an egg is more than it is on the contents of the egg within the shell, we may accept the Newtonian hypothesis that the shell of the earth (called so by Herschel) composing the oblate form of the earth, is more strongly attracted than the rest of the earth. But the hypothesis is so contrary to reason, lacking the verifications of nature, as to demand its exclusion from the pale of science.

The Tides.

When the matter of our earth was started into motion round its axis, the forces to cause the tides were generated. The centrifugal force to cause the rise, and the centripetal force to cause the fall, of the waters. Hence the origin of the tides, and all observed true phenomena may be traced to the centrifugal and centripetal forces of the earth, every atom of its matter being perpetually subjected to these forces in the given case.

On this affirmation I rest, in the consciousness of its entire truth; for as I have demonstrated that all the known forces of nature pertaining to a heavenly body may be generated by a single impulse, it results that nature, in her works, is independent of the dogma of universal gravitation.

An Antic of Universal Gravitation.

It is assumed that from a given point the waters of a distant sphere may be urged in opposite directions.

According to Sir Isaac Newton, the attraction of every particle of the matter of a sphere may be assumed to be lodged in the centre of the globe, and on this hypothesis let the centres of the earth, moon, and sun be in a straight line, the moon being between the earth and sun, and the mutual attractions of the three bodies exerted in the line of the conjunction of the earth, moon, and sun.

From the centre of the earth in this line the attractions of the sun and moon are said to draw the waters of the earth toward them, causing a high tide on the side of the earth nearest to the sun and moon; and the same attractions of the sun and moon are supposed to project in an opposite

direction from the centre of the earth the waters, causing a high tide on this opposite side of the earth. But the assumptions involving, as they do, the theory that the whole of the attractions of the sun and moon in a given line may both pull and push a part of the matter from the centre of a third distant sphere in opposite directions, is an antic indeed, and too contrary to true wisdom to find a place in true philosophy. On one side of the earth there may be a high tide, in the time of the entire absence of the sun and moon, they for the time being on the other side of the earth ; and if on one side, why not on the other, for like causes produce like effects, and our conclusion is adverse to the received theory.

Apparent Stellar Motions.

The disciples of Newton and Copernicus are at fault in ascribing as an effect the apparent daily acceleration of the stars to the annual motion of the earth.

In T. Dick's works, Vol. III., p. 19, under the caption, "Annual Motion of the Stars," speaking of the changes which the clusters of stars undergo from time to time, he says : "Those variations in the appearance of the stars lead to the conclusion that there is an apparent annual revolution of these luminaries."

In Burritt's *Geography of the Heavens*, p. 29, he says : "In consequence of the earth's motion eastward in its orbit, the stars seem to have a motion westward beside their apparent diurnal motion." This apparent annual revolution of the stars, like the apparent yearly revolution of the sun, T. Dick says, is due to the "annual revolution of the earth

around the sun." This conclusion is also maintained by Burritt. That the astronomers were mistaken is made out in a most conclusive way by an appeal to the facts of nature.

The amount of the mean daily acceleration of the stars westward is 59′ 10″.68+, but the amount of arc which the earth describes in its mean daily motion in its orbit is 59′ 8″.33. Hence the arc or angle described by the stars in their mean daily acceleration is 2″.35+ more than the arc described by the earth in its mean daily motion in its orbit. On this account, when the astronomers attribute the cause of the apparent yearly motion of the stars to the motion of the earth in its orbit, they stand impeached for want of the true knowledge of the facts of nature.

Cause of the Stars' Daily Acceleration.

An arc of the celestial equator appears to pass the meridian in the time of a mean solar day, equal to 360° 59′ 10″.68+, and but 360° in the time of a sidereal day.

By using the time (24 hours) of a mean solar day as a standard of measurement, take the time of some mean midnight, with a star on your meridian, and at the time of the next mean midnight the star will be advanced beyond your meridian westward an amount of angular measurement equal to 59′ 10″.68+. So from one mean midnight to another in the time of 365 mean solar days, by these arcs of 59′ 10″.68+, the stars will move eastward presenting all the phenomena described by Dick in the time of 365 mean solar days, or which is the same, the time of 366 sidereal days, which is in time 6 hours, 9 minutes, 9.6 seconds less than

the time of the astronomers' year of the earth by the stars.

If you were to determine the revolutions of the earth on its axis by a star, every time the earth made one exact revolution on its axis, the stars would finish a complete apparent sidereal day revolution around the axis of the heavens; but when you extend the standard of time to that of a mean solar day, in consequence of it the stars will have a mean daily acceleration of 59′ 10″.68+ westward around the axis of the heavens, in addition to 360° of apparent revolution arising from the motion of the earth on its axis, the same as in their diurnal motion.

Therefore, the observed apparent annual motion of the stars, in the time of 365 solar days, is composed of the arcs of the mean daily acceleration of the stars, belonging to effects of the earth's axial motions transferred to the stars and mixed up with the diurnal motions, and may be made plain by the following:

1. The continual motion of the earth on its axis will cause the stars in appearance, to an observer, to have continual motion.

2. If you take the time in which the earth makes one rotation on its axis, and make this, as the astronomers have done, a standard of time; then, counting the revolutions in consecutive order, the stars will appear to have consecutive diurnal revolution around the axis of the heavens, each consecutive revolution in the exact time in which the earth completes a revolution of 360° on its axis.

3. But if you, as before stated, take the time of a mean solar day, and periods of from midnight to midnight, to watch the stars and conform their mo-

tions to the standard of time, the mean daily accelerations of the stars will give them a westward motion every day, increasing by the addition of an arc of 59′ 10″.68+, resulting in this: That if on the mean midnight of your own selection you find a star on your meridian at the next midnight, it will be advanced westward 59′ 10″.68+, and in the lapse of 365 solar days the star will be on the meridian again.

The astronomers have made a mistake in not noticing that the time of a mean solar day, if applied to the stars, would generate their apparent mean daily acceleration; but attributing it to the mean daily motion of the earth in its orbit, and not perceiving it to arise from the motion of the earth on its axis for the time of a mean solar day, they left the way open for me to show the true way to the children of men.

Law of Planetary Motion.

The planets do not go round the stars like they do round the sun. On this account, when the area of the orbit of the planet is known to be a mere point when compared with the stellar distances, the effect of the orbital motion of the planet on the stars is the same as if the orbital motion had no existence. This agrees with the appearances of nature, and, therefore, the number of the apparent revolutions of the stars ($366\frac{1}{4}$) seen from the earth will be one less (equaling the number of axial rotations) than the number of the revolutions of the earth for the time of its solar year, which are $367\frac{1}{4}$, exactly the number of times the earth turns on its axis by a star, and revolves round the sun.

The Astronomers' Annual Parallaxes.

In the Smithsonian Report for 1858 p. 135, is given certain parallaxes, varying from 0″.915 of a degree, to 0″.046 of a degree. The Smithsonian Report is not inferior in authority and correctness, so far as it moves in concert with all institutions of learning; but I prefer to quote and refer to it, rather than any other, because the Institution was originated as a specialty for the diffusion of knowledge among men. I especially invite the very particular attention of the President, Officers, Board of Regents, and the learned Secretary of the Smithsonian Institution to a careful examination of my claims, lest others of their countrymen, less honorable in fame and position, step in before them in acknowledging the facts of God in nature.

Bessel's Annual Parallax of 61 Cygni, is 0″.348.

(*From Smithsonian Report for* 1858, p. 135.)

Those who accept this parallax as probably true, should take enough interest in the subject to learn that the given distance indicated by it in the Report, instead of being equal to the distance over which a ray of light would move in 9.4 years, should be nearly 19 years. All the astronomers' parallaxes are vitiated by a like quantity, in consequence of their bisecting the isosceles triangle projected in the parallax, taking but one-half of the base line, without correspondingly reducing the measured parallax a like quantity.

If a star seen from the extremities of the diameter of the earth's orbit suffers an apparent displacement of 2″ of a degree, the distance indicated by it would be about twenty trillions of miles. But if you bisect the isosceles triangle, and take the semi-

diameter of the earth's orbit for the base line, and also for the angular subtense of the parallax, as is done in the Smithsonian Report for 1858, p. 132, the resulting distance will be about twenty trillions of miles, the same as when the conditions involved the whole of the diameter of the earth's orbit for the base line of 2″ of parallax. But I propose the true and whole diameter of the earth's orbit to be used as a base line of an annual parallax, as defined by Webster, and from its extremities it is assumed that a star seen had an annual parallax of 1″ of a degree, and trigonometrically, or by my new methods by simple proportion and division, the result will be the same, about forty trillions of miles, or twice as much as is given by the astronomers. This is what I mean when I say that the manner of the astronomers in bisecting their annual parallaxes lead to but half the true result.

Now, I have given an annual parallax of 1″, and if you will, you may bisect the isosceles triangle of the parallax after the manner of that to which I have referred you in the Smithsonian Report; and also bisect the angle of the parallax which was subtended by the diameter of the earth's orbit, and the result will be, as before, about forty trillions of miles, twice as far as the men of science have heretofore thought the distance of the stars was from an annual parallax of one second of a degree. I will now particularly notice Bessel's annual parallax of 61 Cygni, it being 0″.348 of a degree. Wishing to place the argument on the most solid foundation, becoming the dignity of the subject and the fame of the discoverer, I will place before the reader what is said about the base line of annual parallaxes in the Smithsonian Report for

1858, p. 132: "Our change of position, involving a distance of more than 200,000,000 of miles, dwindles down to nothing in comparison with the line which extends from the earth to the stars." Admit this, and then the base line of Bessel's parallax was nothing, and the parallax must have been 0″.000 also.

Axiom.

The star 61 in the Swan was observed from a mere point, and such observations culminated in a point; and hence any amount of an appreciable parallax, when the extent of field of observation admitted of no other extension than could be afforded from a mere point, was impossible.

When, in addition to this, you take into consideration that Bessel's observations of 61 Cygni were at all times complicated by the diurnal and supposed annual aberration of the light of the stars, by the assumed precession of the equinoxes, the nutation of the earth's axis, the refraction of light, and the deflection of the light of the stars as it enters our atmosphere, the probabilities of the truth of his parallax have vanished away.

Peters' Annual Parallax of Capella is 0″.046.

The annual parallax of the star Capella, by Peters, printed in the Smithsonian Report for 1858, p. 135, is 0″.046 of a degree, and the time required for its light to reach us is said to be 71.7 years.

The Difference Between Theory and Facts.

A parallax of 0″.046 of a degree, seen from the extremities of the diameter of the earth's orbit, in-

dicates a distance forty-two times greater than that of Herschel's annual parallax of 1″ of a degree, as set forth in the fourth edition of his *Outlines of Astronomy*, p. 456, and light would require a period of over 140 years to pass over the distance. Reduce the line of the diameter of the earth's orbit to a yard, and Herschel's resulting distance from a parallax of 1″ of a degree in the same proportion, and their relation to each other is as one yard to sixty miles nearly.

Again: with the diameter of the earth's orbit reduced to a yard, and the distance indicated by Peters' annual parallax of the star Capella in the same proportion, and the relation they bear to each other is as one yard to 2,520 miles. This analysis clearly aids ordinary minds to readily perceive that these things being so, the proportions at once lead to the conclusion that all such annual parallaxes are merely theoretical.

Does not this comparison place the annual parallaxes in so forlorn an estate as to render their acceptance as facts of nature impossible, they appearing more like impositions in science than beautiful developments of natural truth?

1. The parallax of the star Capella indicates a distance of over 850,000,000,000,000 of miles, which is about twice the distance allowed for in the Smithsonian Report.

2. The distance indicated by the parallax of the star Capella is forty-two times greater than Herschel's annual parallax of 1″, and is twice the quantity allowed for in the Smithsonian Report.

3. Light is known to travel at the rate of 192,000 miles each second of time, and at this rate it would require over 140 years for the light

of the star to reach the earth—twice as long as is allowed for in the Smithsonian Report.

4. Because visual rays directed from the extremities of the diameter of the earth's orbit to a star, supposed to be 19,788,239,040,000 of miles from the earth, will coincide and be the same with respect to the star, it becomes a monstrosity in science to suppose that at forty-two times the distance the visual rays of the observer will cross each other, and subtend a parallax of 0″.046 of a degree. Or you may discount the half of the calculation, and get down to that of the Smithsonian Report, and the same fact concerning the law of distance cuts off all hope of obtaining an annual parallax. You may make another discount of one-half, and get far below the calculation of the Smithsonian Report, and still there comes, from the profound, unfathomable distance, no hope for annual parallaxes.

Universal Gravitation.

In the Smithsonian Report for 1856, p. 200, it says: "Newton's theory of universal gravitation: the most extended generalization ever established by man. It may be expressed as follows:

"1. The attraction exists between the atoms of all matter at finite distances, and is the same for all kinds of matter; hence,

"2. The force of attraction is proportional to the mass of the attracting body, the distance being the same.

"3. If the same body attracts several bodies at different distances, the forces are inversely as the square of the distances.

"All deductions from this theory are in strict

accordance with the phenomena of nature. The only proof of the truth of any physical law."

At this point I join issue with the scheme, and say: Because the truly understood phenomena of nature is in strict disaccordance with the deductions from the theory of universal gravitation, it can not be true. And because the assumed attraction of the sun is capable of carrying around the sun in orbits as many bodies as can be placed side by side, in as many orbits as can be described in the bounds of the system of the sun, this repletion is too much for the theory as heretofore expounded to endure; and this being too much, exposes its own fallacy.

The Assumed Quantity of the Sun's Attraction.

The force of the attraction of the sun has been estimated to be between five and seven hundred times more than all the forces of all the other bodies of the solar system; but I am prepared to prove that the sun is as capable of carrying a number more than a thousand times greater than all the bodies which are now assumed to be carried round the sun by his own attraction, as he is capable of carrying Mercury alone by the theory.

Extent of the Sun's Attraction.

From every point of the surface of the sun radiating into space the light of the sun goes forth, extending beyond the orbit of Neptune, the light decreasing in intensity as the square of the distance increases.

So the attraction of gravitation from every point of the surface of the sun, it is said, goes forth, and extends beyond the orbit of Neptune, decreasing in intensity as the square of the distance increases,

and thus it appears that the disciples of Newton hold that a like law which obtains in nature in respect to the light of the sun, holds good in respect to their assumed dogma of the attraction of the gravity of the sun.

Furthermore, you are not to suppose that the mutual gravitation of a planet and the sun are gathered up and follow the planet round the sun; but like as a body or planet moves in the vast field or ocean of the sun's light, or like a fish moves through the water, or a bird moves through the air, so a heavenly body moves through the vast field of the sun's attraction of gravitation, which has been assumed to be coequal with the extent of the light of the sun, and governed by the same law of the square of the distance.

You are also to conclude that the sun's attraction of gravitation is not arrested by the density of a heavenly body, as the light of the sun is; but, according to the theory, it passes through a body, however dense it may be, with as much freedom as if the space occupied by the planet was free from every obstruction, and to suppose otherwise, would in the event of a conjunction of all the planets, tumble the theory of universal gravitation into inextricable confusion.

Illustration.

Divide the area of the orbit of the earth into as many angles or parts as may be subtended by the equatorial diameter of the earth, seen from the centre of the sun. In every one of these angles or parts the attraction of gravity of the sun is supposed to be always present, the same as is the sun's light, the former to move the earth, the latter for its illu-

mination, without any respect to the presence or absence of the earth. All of the Newtonian philosophy are free to admit the sufficiency of the force of the sun's attraction to carry the earth over any one of these angles or parts, in the earth's journey through the vast ocean of the attraction of gravitation; and if so, why not sufficient to carry a globe of the size and mass of the earth, placed in every one of these angles in a revolution round the sun? In this attraction of the sun on the planets, the astronomers have perpetrated a darling error in assuming to weigh the sun against the planets on an imaginary steelyard or balance, and on such a basis they have computed the weight of the bodies of the solar system, and made it the measure of the mutual attractions of all the bodies revolving around the sun. Admit the astronomers' law in this case, and at a time when the planets are in conjunction, if then they can be weighed against the sun, by the same reasons a like experiment may be tried on the opposite side of the sun with another imaginary steelyard or balance, and another set of planets like those first weighed, and the result must be the same. So you may project as many radii from the sun's centre to the outmost bounds of the solar system as the circular space will admit of, to accommodate the diameters of the planets. Use these radii as imaginary steelyards or balances, place on every one of them bodies exactly like the planets, of the same number, and simultaneously they may all be weighed against the sun without any more disturbing his force or position than would the weighing of the planets alone against the sun, and with the same imaginary result.

Now select one of the angles into which the area

of the earth's orbit was divided, and let it be the one beginning with the vernal equinoctial point; and as the earth moves out of this angle, the force does not move along with it, but remains in the angle, and is as potent to move a second and third earth following the first as it was the first one. So on add globe to globe in consecutive order, until the sun is surrounded with a ring of globes of the size and density of our earth, and the force of the sun's attraction to cause the orbital motion of the earth is also sufficient, because of its abiding force over the whole orbit, to carry this ring of globes round the sun in continual orbital motion. Deny this, and you deny the doctrine of universal gravitation. Call to mind the spherical space illuminated by the sun, the outskirts of which are far beyond the orbit of Neptune, and at every point within it there is assumed to be continually present some force of the sun's attraction, as intense as when at first the primordial laws of the universe were called into requisition by the Creator. Some have thought that Mercury is as dense as lead, and the planets outward are decreased in density, so that the density of the matter of the planet Neptune equals the density of cork. With some such scale of decreasing density over the square of the distance from the sun, suppose at every point within the solar system an atom of matter to be present, and the atoms free to move among themselves. Now let every one of these atoms of the density of lead at Mercury's distance, decreasing to the density of cork at Neptune's distance, from the sun, be subjected to the Newtonian projectile and centripetal forces, and for the reason, if it be the sun's attraction that carries the planets around the sun, the same force is

sufficient to carry every one of these atoms round the sun, because the force of gravitation in unwasted energy is assumed to be ever present at every point of the spherical space of the solar system. This is so much more than the system of weighing the sun against the planets can endure, that it, and all that is related to it, should be abandoned for a better way of knowledge.

Universal Gravitation.

The Smithsonian Report for 1856 defines the attraction of gravitation to be, "(46) The reciprocal tendency of all parts of the solar system to approach each other;" and, "(50) Gravitation the most feeble of all attractions."

1. Of the bodies of the solar system this can not be true, because the forces of the axial and orbital revolutions of the spheres are greater than the calculated gravitation of the spheres among themselves.

2. On p. 18 there is an experiment to show how a certain quantity of matter may or may not be under the action of the gravitation of the sphere. Such is the nature or effect of axial rotation, that any forces exterior to the rotating heavenly body are abundantly overcome by it, securing the stability of the motion of the body.

3. All error carries with it the seeds of its own dissolution, the means of its own refutation. The admission that the force of gravitation is the most feeble of all attractions, is weakness indeed. Weakness to such an amount as is worthy to be lost sight of in calculating and accounting for the forces of nature to move the heavenly bodies, unless you assume that a weak force overcomes a stronger one, which is absurd.

The Crown in View.

(*Smithsonian Report for* 1856, p. 201.)

"(52) The earth is nearly a sphere, and all bodies fall in straight lines, directed nearly to its centre."

What a fruit of cultivated ignorance, and the evidence of how the noble in intellect servilely follow tradition! There was a time when, on the descent of bodies, the students of nature were divided in opinion; some claiming that all motion was originally and naturally curvilinear; and others, that all motion was naturally and originally rectilinear. This latter opinion, though contrary to nature, prevailed; and now, without a true why or wherefore, even the learned Secretary of the Smithsonian Institution avows this error for truth, when all the phenomena of nature, THE ONLY PROOF OF THE TRUTH OF ANY PHYSICAL LAW, are opposed to his teaching.

That bodies do not fall in straight lines, directed nearly to the centre of the earth, or as others teach, directed exactly to the centre of the earth (for the scholars are not agreed), is demonstrated by the fall of meteors, and also by the descent to the earth of all kinds of projectiles, they universally and invariably describe curve lines in their descent, being subject to the forces of the earth's motions, from the force of which they can not escape. And because in the phenomena of nature there is no true record of the observed right-line motion of any body, the law of straight-line motion, taught in the Smithsonian Report, is not consonant with the facts of nature, and therefore not true.

The hypothesis of universal gravitation endows

every atom of matter with power to move itself. This is contrary to nature, matter being alike indifferent to rest or motion, its perfect passivity being originally necessary to permit of its being moved; and when started into motion around the axis of each one of the heavenly bodies, then, and not before, arose the attraction of the matter of the sphere to its axial centre. Hence the origin of the gravitation of the matter of each one of the heavenly bodies; and being confined to the sphere and its atmosphere, the natural, proper, and significant name of it is Spheroidal Gravitation.

This spheroidal gravitation, in its effects, was seen by Sir Isaac Newton, but not understood by him; and hence, instead of attributing the descent of bodies to the earth, and the tendency of every particle of the matter of the earth, to the attracting tendency of the earth's axial rotation, the earth's true centripetal force, he supposed an unseen power, to himself, as he confesses, perfectly incomprehensible, to draw all the particles of the matter of the earth to its centre. He then stamped every particle of all the matter in the universe with this mistake, and originated his now universally received doctrine of universal gravitation. Had he known that from a single impulse a globe could be urged in the direction of a curve line, some of the labor of the *Principia* would have been expended in another theory of the celestial motions.

I have shown, on p. 73, that from a projectile impulse a globe may be urged in the direction of a curve line; and such a demonstration led me to the conclusion, that the same kind of force would turn a planet on its axis, and urge it forward over an arc of its orbit; and because the curve-line

motion of a globe arising from a single impulse may be more or less curved, so as to agree with the curve of any circle, ellipse, or epicycle, it became evident to me that all the directions of motions and varieties of orbits in which the heavenly bodies are known to move were originated by single impulses, and these discoveries originated the right, the authority, and duty to say to mankind: Behold the way of the Lord in nature!

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